

NAME: SOLUTIONS

QUIZ 5

Dawson College

Course Code: 201-NYA-05 S07

Date: April 15th 2011

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Question 1. (1 mark each)

Integrate the following.

(a)

$$\int x^{-1} dx = \boxed{\ln|x| + C}$$

(b)

$$\int \frac{-2}{x^3} dx = \int -2x^{-3} dx = -2 \frac{x^{-2}}{-2} + C = \boxed{x^{-2} + C}$$

(c)

$$\int \sin x - \sec^2 x dx = \boxed{-\cos x - \tan x + C}$$

(d)

$$\int 4e^x + \pi^3 dx = \boxed{4e^x + \pi^3 x + C}$$

(e)

$$\int \frac{-3}{\sqrt{1-x^2}} dx = \boxed{3 \operatorname{Arccos} x + C} \text{ or } \boxed{-3 \operatorname{Arcsin} x + C}$$

(f)

$$\int 5 \cos x + (1+x^2)^{-1} dx = \boxed{5 \sin x + \operatorname{Arctan} x + C}$$

Question 2. (3 marks)Find the function $f(x)$ that satisfies the following conditions:

$$f'(x) = \sqrt{x} - x^3 - 2 \text{ and } f(4) = -22$$

$$f(x) = \int f'(x) dx = \int x^{1/2} - x^3 - 2 dx = \frac{x^{3/2}}{3/2} - \frac{x^4}{4} - 2x + C$$

$$f(4) = -22 \rightarrow -22 = \frac{2}{3}(4^{3/2}) - \frac{4^4}{4} - 2(4) + C$$

$$-22 = \frac{16}{3} - 64 - 8 + C$$

$$\frac{134}{3} = C$$

$$\text{so } f(x) = \frac{2}{3}x^{3/2} - \frac{x^4}{4} - 2x + \frac{134}{3}$$

Question 3. (2 marks each)Find the value of a in each of the following equations.

(a)

$$\int \frac{3}{2x^5} dx = ax^{-4} + C$$

$$\downarrow$$

$$= \int \frac{3}{2} x^{-5} dx = \frac{3}{2} \frac{x^{-4}}{-4} + C = -\frac{3}{8} x^{-4} + C$$

$$\text{so } a = -\frac{3}{8}$$

(b)

$$\int -25x^4 dx = ax^5 + C$$

$$\downarrow$$

$$= -25 \frac{x^5}{5} + C = -5x^5 + C \quad \text{so } a = -5$$

(c)

$$\int 5x^{-1/2} dx = a\sqrt{x} + C$$

$$\downarrow$$

$$= \frac{5x^{1/2}}{1/2} + C = 10x^{1/2} + C$$

$$= 10\sqrt{x} + C$$

$$\text{so } a = 10$$